

**REMARKS/ARGUMENTS**

**Claim Status – Request for Reconsideration**

Reconsideration of this application is requested. The claims presented for reconsideration are claims 19-32.

**Specification - Objection**

The specification has been objected to for the German-derived use of the term “benzole sulfonic acid,” rather than its English language equivalent, “benzene sulfonic acid.”

Accordingly, Applicant has corrected the term as requested by way of the attached substitute specification. A marked-up version of the substitute specification is also attached that shows where corrections have been made. No new matter has been included.

**Claim Objections**

The claims have been objected to for the use of the term “benzole sulfonic acid” and for improper claim numbering. Appropriate corrections have been made by way of this amendment. Additionally, the claims have been amended for further clarity. No new matter has been included.

**Claim Rejections - 35 U.S.C § 112**

Claim 32 has been rejected under 35 U.S.C. § 112, second paragraph, for insufficient antecedent basis for the term “the activator elements.” That claim having been appropriately amended, the rejection has been overcome. Accordingly, removal of this rejection is requested.

**Claim Rejections - 35 U.S.C § 103**

Claims 19-20, 24, 31 and 32 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,615,991 (Obayashi) in view of U.S. Patent No. 6,136,222 (Friesen). This rejection is traversed and reconsideration is requested.

This invention is directed to a method for regenerating denox catalyst in which the catalyst has an accumulation of iron compounds. The accumulation of such iron compounds has been found to be undesirable in that the compounds typically reduce the activity of various

catalytic components present in denox catalysts. The method of this invention, therefore, provides for the removal of a significant portion of the accumulated iron compounds such that the result is a regeneration of the catalyst (i.e., a significant increase in catalytic activity as a result of carrying out the steps of the method).

As stated in the claims, the method of this invention includes a step of treating the denox catalyst with a substantially aqueous acidic solution in which the solution is an addition product of at least one acid and one antioxidant. Preferably, the acid is at least one inorganic or organic acid. Desirably, the acid is selected from the group consisting of  $H_2SO_4$ ,  $HCl$ ,  $H_3PO_4$ ,  $HNO_3$ , oxalic acid, citric acid, malonic acid, formic acid, chloroacetic acid, and benzene sulfonic acid. The at least one antioxidant is preferably selected from the group consisting of substituted phenols, hydroquinones, catechols, aliphatic mercapto compounds, araliphatic mercapto compounds, aromatic mercapto compounds, dithiocarbonates, hydroxycarboxylic acids, enediols, phosphites, and phosphonates, including salts, esters and metal complexes thereof. The treatment removes at least a portion of the iron compounds accumulated on the denox catalyst thereby regenerating the denox catalyst.

Obayashi discloses a method for recovering the catalytic activity of tungsten-titania and tungsten-titania-vanadium denitrating catalysts. These types of denitrating catalysts are also typically referred to as denox catalysts.

The Obayashi method includes contacting the denitrating or denox catalysts that have reduced denitrating performance with an aqueous oxalic acid solution so as to elute compounds that undesirably raise the  $SO_2$  oxidizing power of the catalysts. The contacted or treated catalysts can then be washed and reimpregnated with an active catalyst component such as tungsten. See column 2, lines 10-30.

Obayashi differs from the claimed invention in that Obayashi does not use an acidic solution that includes at least one antioxidant. As discussed above, treating a denox catalyst with a substantially aqueous acidic solution in which the solution is an addition product of at least one acid and one antioxidant removes from the denox catalyst accumulated iron compounds and regenerates the denox catalyst. Such a regeneration method of a denox catalyst is not suggested by Obayashi.

Friesen was cited in the office action for allegedly disclosing “the regeneration of a transition-metal nitrogen-removing catalyst complex comprising (*inter alia*) the metal and a compound selected from the group consisting of (*inter alia*) dithiocarbonates and catecholates . . . by treatment with aqueous hydrochloric or sulfuric acid.” Office Action, page 4. Based on this finding of fact, it was concluded that “performing Obayashi’s process with its formulation therefore in addition to Friesen’s antioxidant additive would have been obvious to one of ordinary skill in the art at the time of the invention.” *Id.*

Applicant respectfully takes issue with the conclusion of obvious in the office action, because the conclusion is based on an error of fact. It is not correct that Friesen discloses a method of regenerating a catalyst. Rather, Friesen discloses a liquid composition that is a nitrogen-sorption and -desorption composition, and the use of that composition to remove nitrogen from other gases such as natural gas.

Friesen indicates that the problem he is addressing is “the need for a simple, efficient and low cost method of selectively removing nitrogen from natural gas.” Column 1, lines 27-28. Friesen solves that problem by providing a process that comprises

... adsorbing molecular nitrogen from a nitrogen-containing feed stream typically containing substantially no oxygen, and no carbon monoxide, by contacting the feed stream with the nitrogen-sorption and -desorption material, followed by desorbing nitrogen from the sorption material. Desorption may be accomplished by temperature swing, pressure swing, or a combination of the two. If the nitrogen-sorption capacity decreases over time due to deactivation of the sorption material, an optional step to improve efficiency is regeneration of its nitrogen-sorption capacity by various methods.

[Column 2, lines 35-45.]

Friesen’s nitrogen-sorption and -desorption material has “two essential components: a solvent; and a transition metal complex.” Column 3, lines 4-5. In other words, Friesen’s nitrogen-sorption and -desorption material is a liquid. This liquid is a “reversible nitrogen-binding” composition in which nitrogen is “reversibly bound.” See column 4, lines 46-57. “The nitrogen-absorbing capability of the solution may be periodically regenerated by a variety of techniques....” Column 19, lines 31-33.

Friesen's nitrogen-sorption and -desorption material is, therefore, not a catalyst, and in particular, is not a denox catalyst. A denox catalyst, such as that disclosed by Obayashi, is a solid material "by which NOx is reduced to harmless nitrogen in the presence of [the denox] catalyst by use of ammonia as a reducing agent." Obayashi at column 1, lines 18-20. Thus, Friesen's composition and method bear no relationship to Obayashi or to applicants' claimed invention, and the conclusion that the combination of Obayashi and Friesen would have been obvious is based on factual error. Accordingly, removal of this rejection is requested.

**CONCLUSION**

Having demonstrated that the cited references fail to disclose or suggest the invention as claimed, and all other formal issues having now been fully addressed, this application is believed to be in condition for allowance. Accordingly, applicant requests early and favorable reconsideration in the form of a Notice of Allowance.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated, since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an extension of time sufficient to effect a timely response. Please charge any deficiency in fees or credit any overpayments to Deposit Account No. 09-0528 (Docket #:C293 1040 US).

Respectfully submitted,

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